

WHAT IS CLAIMED IS:

1. A photovoltaic cell, comprising:
 - a first electrode;
 - a mesh electrode; and
 - an active layer between the first and mesh electrodes, the active layer comprising:
 - an electron acceptor material; and
 - an electron donor material.
2. The photovoltaic cell of claim 1, wherein the mesh electrode is a cathode.
3. The photovoltaic cell of claim 1, wherein the mesh electrode is an anode.
4. The photovoltaic cell of claim 1, wherein the mesh comprises an electrically conductive material.
5. The photovoltaic cell of claim 4, wherein the electrically conductive material is selected from the group consisting of metals, alloys, polymers and combinations thereof.
6. The photovoltaic cell of claim 1, wherein the mesh electrode comprises wires.
7. The photovoltaic cell of claim 6, wherein the wires comprise an electrically conductive material.
8. The photovoltaic cell of claim 7, wherein the electrically conductive material is selected from the group consisting of metals, alloys, polymers and combinations thereof.
9. The photovoltaic cell of claim 6, wherein the wires comprise a coating including an electrically conductive material.
10. The photovoltaic cell of claim 9, wherein the electrically conductive material is selected from the group consisting of metals, alloys, polymers and combinations thereof.

11. The photovoltaic cell of claim 1, wherein the mesh electrode comprises an expanded mesh.

12. The photovoltaic cell of claim 1, wherein the mesh electrode comprises a woven mesh.

13. The photovoltaic cell of claim 1, wherein the electron acceptor material comprises a material selected from the group consisting of fullerenes, inorganic nanoparticles, oxadiazoles, discotic liquid crystals, carbon nanorods, inorganic nanorods, polymers containing CN groups, polymers containing CF₃ groups and combinations thereof.

14. The photovoltaic cell of claim 1, wherein the electron acceptor material comprises a substituted fullerene.

15. The photovoltaic cell of claim 1, wherein the electron donor material comprises a material selected from the group consisting of discotic liquid crystals, polythiophenes, polyphenylenes, polyphenylvinylenes, polysilanes, polythienylvinylenes and polyisothianaphthalenes.

16. The photovoltaic cell of claim 1, wherein the electron donor material comprises poly(3-hexylthiophene).

17. The photovoltaic cell of claim 1, further comprising a hole blocking layer between the active layer and the first electrode.

18. The photovoltaic cell of claim 17, wherein the hole blocking layer comprises a material selected from the group consisting of LiF, metal oxides and combinations thereof.

19. The photovoltaic cell of claim 1, further comprising a hole blocking layer between the active layer and the mesh electrode.

20. The photovoltaic cell of claim 19, wherein the hole blocking layer comprises a material selected from the group consisting of LiF, metal oxides and combinations thereof.

21. The photovoltaic cell of claim 1, further comprising a hole carrier layer between the active layer and the mesh electrode.

22. The photovoltaic cell of claim 21, wherein the hole carrier layer comprises a material selected from the group consisting of polythiophenes, polyanilines, polyvinylcarbazoles, polyphenylenes, polyphenylvinylenes, polysilanes, polythienylenevinylenes, polyisothianaphthhanenes and combinations thereof.

23. The photovoltaic cell of claim 1, further comprising a hole carrier layer between the active layer and the first electrode.

24. The photovoltaic cell of claim 23, wherein the hole carrier layer comprises a material selected from the group consisting of polythiophenes, polyanilines, polyvinylcarbazoles, polyphenylenes, polyphenylvinylenes, polysilanes, polythienylenevinylenes, polyisothianaphthhanenes and combinations thereof.

25. The photovoltaic cell of claim 1, wherein the first electrode comprises a mesh electrode.

26. A photovoltaic cell, comprising:
a first electrode;
a mesh electrode;
an active layer between the first and mesh electrodes, the active layer comprising:
an electron acceptor material; and
an electron donor material;
a hole blocking layer between the first electrode and the active layer; and
a hole carrier layer between the mesh electrode and the active layer.

27. The photovoltaic cell of claim 26, wherein the mesh comprises an electrically conductive material.

28. The photovoltaic cell of claim 27, wherein the electrically conductive material is selected from the group consisting of metals, alloys, polymers and combinations thereof.

29. The photovoltaic cell of claim 26, wherein the hole carrier layer comprises a material selected from the group consisting of polythiophenes, polyanilines, polyvinylcarbazoles, polyphenylenes, polyphenylvinylenes, polysilanes, polythienylenevinylenes, polyisothianaphthhanenes and combinations thereof.

30. The photovoltaic cell of claim 29, wherein the hole blocking layer comprises a material selected from the group consisting of LiF, metal oxides and combinations thereof.

31. The photovoltaic cell of claim 26, wherein the hole blocking layer comprises a material selected from the group consisting of LiF, metal oxides and combinations thereof.

32. The photovoltaic cell of claim 26, wherein the mesh electrode comprises wires.

33. The photovoltaic cell of claim 32, wherein the wires comprise an electrically conductive material.

34. The photovoltaic cell of claim 33, wherein the electrically conductive material is selected from the group consisting of metals, alloys, polymers and combinations thereof.

35. The photovoltaic cell of claim 32, wherein the wires comprise a coating including an electrically conductive material.

36. The photovoltaic cell of claim 35, wherein the electrically conductive material is selected from the group consisting of metals, alloys, polymers and combinations thereof.

37. The photovoltaic cell of claim 26, wherein the mesh electrode comprises an expanded mesh.

38. The photovoltaic cell of claim 26, wherein the mesh electrode comprises a woven mesh.

39. The photovoltaic cell of claim 26, wherein the first electrode comprises a mesh electrode.

40. The photovoltaic cell of claim 26, further comprising a substrate supporting the mesh electrode.

41. The photovoltaic cell of claim 40, further comprising an adhesive material between the substrate and the hole carrier layer.

42. The photovoltaic cell of claim 40, wherein the hole carrier layer is in contact with the substrate.

43. A photovoltaic system comprising a plurality of photovoltaic cells of claim 1, at least some of the plurality of photovoltaic cells being electrically connected.

44. The photovoltaic system of claim 43, wherein all of the plurality of photovoltaic cells are electrically connected.

45. The photovoltaic system of claim 43, wherein at least some of the electrically connected photovoltaic cells are electrically connected in parallel.

46. The photovoltaic system of claim 43, wherein at least some of the electrically connected photovoltaic cells are electrically connected in series.

47. The photovoltaic system of claim 43, wherein the photovoltaic system is wherein at least some of the electrically connected photovoltaic cells are electrically connected in to a load.

48. A photovoltaic system comprising a plurality of photovoltaic cells of claim 24, at least some of the plurality of photovoltaic cells being wherein at least some of the electrically connected photovoltaic cells are electrically connected.

49. The photovoltaic system of claim 48, wherein all of the plurality of photovoltaic cells are electrically connected.

50. The photovoltaic system of claim 48, wherein at least some of the electrically connected photovoltaic cells are electrically connected in parallel.

51. The photovoltaic system of claim 48, wherein at least some of the electrically connected photovoltaic cells are electrically connected in series.

52. The photovoltaic system of claim 48, wherein the photovoltaic system is wherein at least some of the electrically connected photovoltaic cells are electrically connected in parallel to a load.